AQUATRON®

MODEL 4x300

USER'S MANUAL
(UNPACKING, INSTALLATION, MAINTENANCE)

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1. INTRODUCTION

IMPORTANT!
For optimal functionality it is very important that this installation manual and the maintenance instructions are being followed closely. In case of problems please contact the main supplier.

This is how it works – the solution is given by nature itself!

The liquid is flushed to a separator where urine and water is separated from faeces and paper. The liquid will then pass through an Ultra Violet unit and may thereafter be infiltrated into the ground or into a suitable receptacle. The solid waste is being composted in a Bio Chamber. If so wished, composting worms may be added in order to accelerate the composting process.

1. Aquatron uses standard Water Closets (flushing volume 3-6 litres) or special models where the urine is mechanically diverted from the flushing water and the solid waste in the bowl itself.

2. When the toilet is flushed, the contents of the bowl are transported to the Aquatron Separator where approx. 98% of the liquid fraction is separated by using the momentum of the flushing water, centrifugal force and gravity. The Aquatron Separator needs no moving parts.

3. The solid waste (paper and faeces) falls down into the Bio Chamber where it is composted by bacteria and, if desired, by worms. If using worms, the volume of the solid waste will be reduced by approx. 90%. The need for emptying and handling the waste is therefore reduced to a minimum. Optionally, after installing an Aquatron System, some 250-300 worms are placed into the Bio Chamber. The number of worms needed to maintain the composting process will be adjusted automatically by nature. Optimal temperature for the composting is 12-25 degrees Celsius, a temperature level recommended for year-round inhabited homes. Freezing will kill the worms. The composting process is free from odour and flies because the Bio Chamber is ventilated and the small amount of liquid following the paper down into the Bio Chamber is removed by a drain at the base of the Bio Chamber. When the Aquatron 90 and 400 models are emptied, the refuse must be composted to soil in the garden together with the normal garden and kitchen waste. However, the models 4x100, 4x200 and 4x300, require no further composting.

4. The liquid proceeds to the UV unit where it is exposed to Ultra Violet light which kills bacteria and viruses. The liquid may then be treated as Grey Water (bath, dish washing and laundry water) which means that the toilet wastewater may be infiltrated into the ground or into a suitable receptacle. Since the liquid fraction is separated from the solid waste, Aquatron Systems are not sensitive to peak load usage.

Congratulations to your decision to buy the biological toilet system Aquatron! Our experiences from many satisfied customers during more than 20 years is that a correctly installed and properly maintained Aquatron system will serve you and your guests well for many years to come.

Henry Steffensen
Managing Director,
Aquatron International,
Amberes AB

2. UNPACKNING

The following parts are packed into the Bio Chamber: Separator, hose clip to fix the Separator parts together, Wire-ring, a branch to be attached to the Bio Chamber outlet, connection pipes between the Separator outlet and branch, 90° Coupler double bend socket connecting the Separator and branch, turning pole, a shovel for the emptying of compost and a ventilation fan. For pitch changes of the 110 mm inlet pipe, a special angled coupler double socket is provided. For height adjustments of the separator, a triangular tray with adjusting knobs is provided.

3. PREPARATIONS

To install the AQUATRON toilet system you will need the following material in addition to the WC. Components marked with an asterisk (*) are included in the shipment. Other items are to be purchased locally if needed.

PIPES:		
WC – Separator	4" Bend x 90º to WC	Amount depending on number of Water Closets to be connected
	4” Coupler double sockets	Amount depending on installation
	4” Angled coupler double socket (*)	For 4 % change of inlet pipe pitch
	4” Pipes	Amount depending on installation
Separator – Grey Water sewage	4” Connecting pipes, 2 items (*)	For the fluid outlet of the separator, - for vertical connection, 75 cm, - for horizontal connection, 80 cm
	4” Coupler double sockets, 2 items (*)	For connections
	4” Coupler double socket 90° bend, 2 items (*)	
	4” Coupler single socket 90° bend (*)	
	T-branch 110 mm / 50 mm socket (*)	Connecting the Bio Chamber drain
	2” Coupler single socket 90° bend (*)	Single socket for Bio Chamber drain
MISCELLANEOUS: **(purchase separately)**	Bark grinds	100 litres (2 bags at 50 litres)
	Platform (*)	For the Bio Chamber
	Ventilation fan, AC 230 V (*)	For the 100 mm ventilation channel
	100 mm ventilation pipes	For the Bio Chamber ventilation

4. INSTALLATION OF THE AQUATRON SYSTEM

4.1 Arrangement of the Bio Chamber

4.1.1 Position the platform firmly and horizontally, then place the Bio Chamber steadily on the platform. For measurements see Figure 1.

4.1.2 The Aquatron system should be installed in a frost free compartment:
- optimal composting temperature is minimum 12° C (55° F);
- at □ermin composting a temperature above 15° C (60° F) is recommended;
- if necessary, insulate the compartment and install a thermostat controlled electric heater.

4.2 Installing the Separator

4.2.1 Put together the upper and lower parts of the Separator unless they are already assembled. Check that the Wire-ring is fully pushed down into the Separator neck and that the wires are not crossed. The upper part of the Separator (Cyclone) should rest upon the Wire-ring. Tighten the hose clip just as much as needed to keep the upper and lower parts of the Separator together. There must be no space between the Cyclone and the Wire-ring, see Figure 2.

4.2.2 Place the triangular height adjustment tray on top of the Bio Chamber. Position the separator on top of the tray and with the separator fluid outlet facing towards the perimeter of the Bio Chamber. Turn the inlet of the Cyclone towards the pipe coming from the Water Closets. Check that the Cyclone rests firmly on the Wire-ring and tighten the hose clip.

4.2.3 The Separator must be installed in a vertical position, see Figure 2.

4.3 Pipe installation WC to Separator

4.3.1 Use 4" pipes between WC and Separator.

> **NOTE: Only WC should be connected to the inlet of the Aquatron Separator. Separate pipes should be used for sewage from bath, kitchen, laundry etc. If these pipes are to be connected, it should be done after the Aquatron system.**

4.3.2 The Separator should be connected to a 4" double socket. **NOTE:** The Separator must be horizontal and its vertical line (see Figure 2) perpendicular to the Bio Chamber. The inlet pipe must be fully inserted into the socket, see Figure 3.

4.3.3 The horizontal distance between the WC and the Separator must be minimum 1 metre and that last metre (closest to Separator) should be pitched at 5% (5 cm), see Figure 4. At further distances the earlier part of the pipe should have a 1% horizontal slope, or as national standards. If needed, use the special 4 % angled coupler double socket in order to achieve the pitch transition, see Figure 4. (**NOTE:** Turn the colour mark of the angled coupler double socket downwards). Furthermore, check that the inclination of the inlet pipe is smooth and that there are no depressions where fluid waste may gather.

4.3.4 If horizontal bends are needed on the Separator inlet pipe, see Figure 5.

4.4 Fluid outlet pipe installation

4.4.1 For the pipes between the fluid outlet of the separator and the Grey Water sewage, there are two 4" connecting pipes included in the delivery. The 75 cm pipe is for the vertical connection and is connected to the horizontal connection pipe (length 80 cm) by the 90 degree bent double coupler socket see Figure 6. To this connection pipe is also connected the drain outlet from the Bio Chamber (2" diameter) by the 2" Coupler single socket 90^{o} bend and a branch. See figure 7.

4.4.2 The outlet should be firmly attached to the supporting Aquatron 4x300 platform.

4.4.3 One 110 mm diameter Water Seal must be installed before the connection to the regular sewer in order to prevent odours from the sewer system to enter the toilet/composting system.

4.5 Installation of ventilation in the Bio Chamber

The ventilation fan should be connected to the 100 mm attachment on top of the Bio Chamber and further to a separate vent channel. The ventilation fan should be connected to a grounded AC 230 V electrical outlet.

> **NOTE! The ventilation must have a separate vent pipe extending over the roof and must not be connected to the other sewer ventilation of the house, as this may cause problems with odour and flies.**

4.6 Flushing test

Ask someone to flush the WC with water only and check how much water is entering into the Bio Chamber. If correctly installed, when flushing with water only, a maximum of 0.5 decilitres should go that way. If too much water enters into the Bio Chamber there are two explanations:

4.6.1 If the water enters the Bio Chamber **at the beginning of the flushing** the velocity of the incoming fluid is too high and the pitch is too large – **decrease** the pitch of the inlet pipe.

4.6.2 If the water enters the Bio Chamber **at the end of the flushing** the velocity of the incoming fluid is too low and the pitch is too small – **increase** the pitch of the inlet pipe.

5. COMPOSTING

5.1 Start up

Drainage of the Bio Chamber: Spread a 4-6 centimetre course bark grinds layer (**NOTE:** Not peat moss!) into each composting compartment of the Bio Chamber. The bark grinds should be evenly spread at the bottom of each compartment. Add some compost from the garden in order to insert micro-organisms. By this the composting process will get a more rapid start.

5.2 Vermi composting

See Item 7.5.

6. SPECIAL SOLUTIONS

6.1 **Urine diversion** (Urine sorting/Urine separation): Urine sorting WCs may be connected to Aquatron toilet systems. Please contact Aquatron International for more information.

6.2 **UV Units**: UV Units (accessory) for killing of the bacteria in the fluid outlet (after separation) could be installed as an option. Please contact Aquatron International for more information.

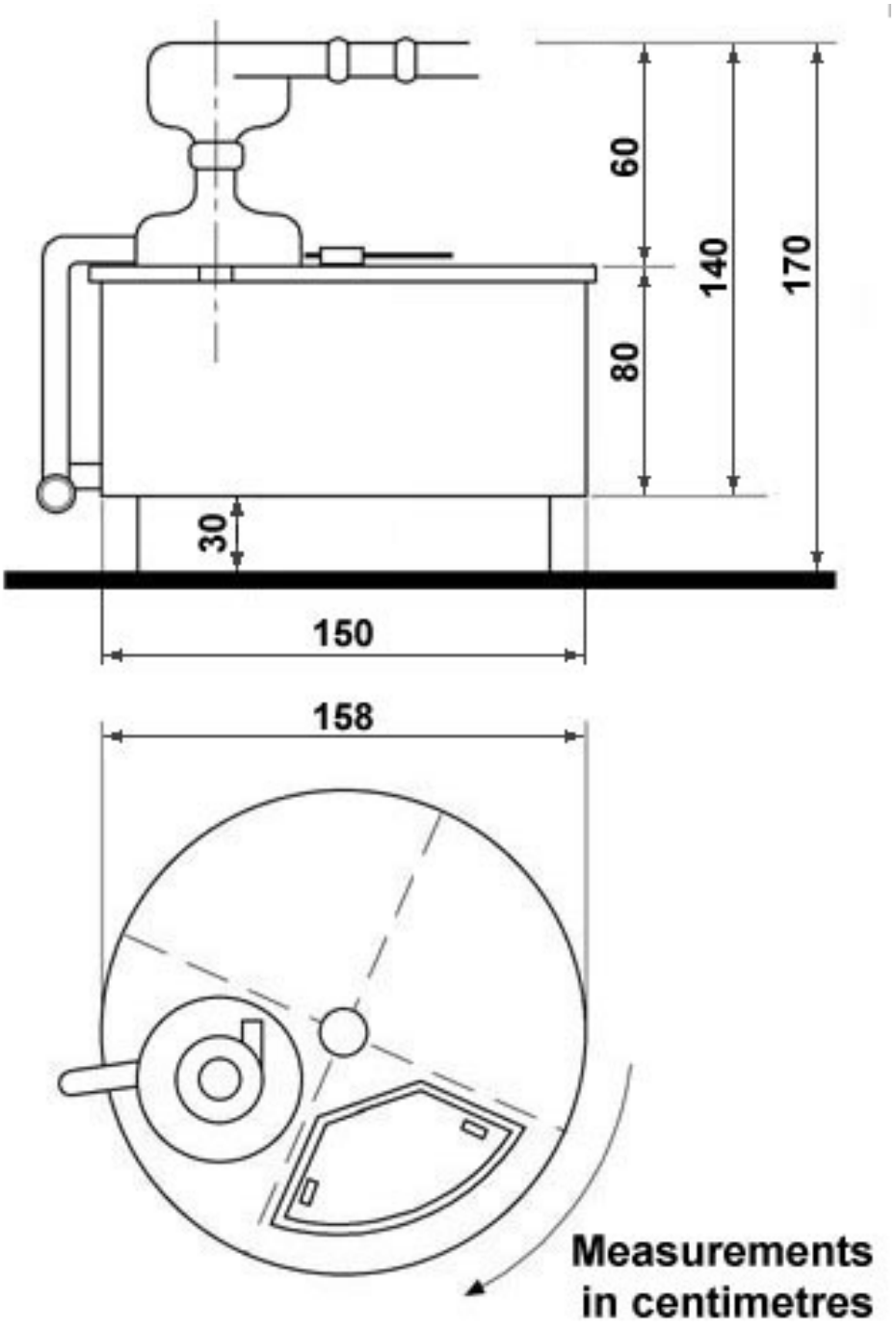


Figure 1: Aquatron 4x300 installation measurements

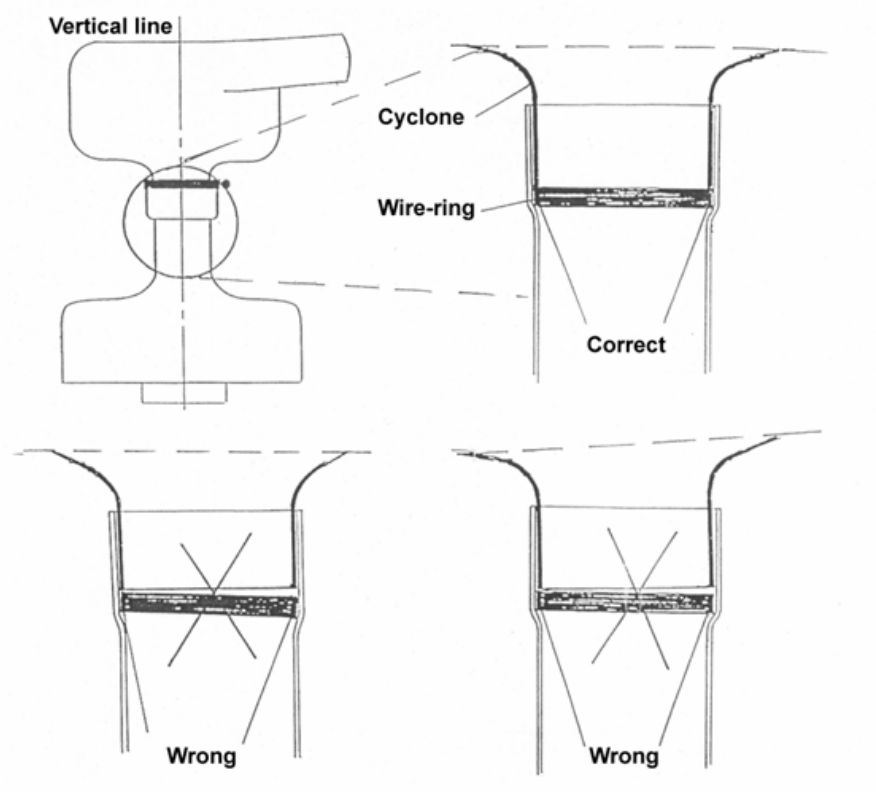


Figure 2: Separator installation

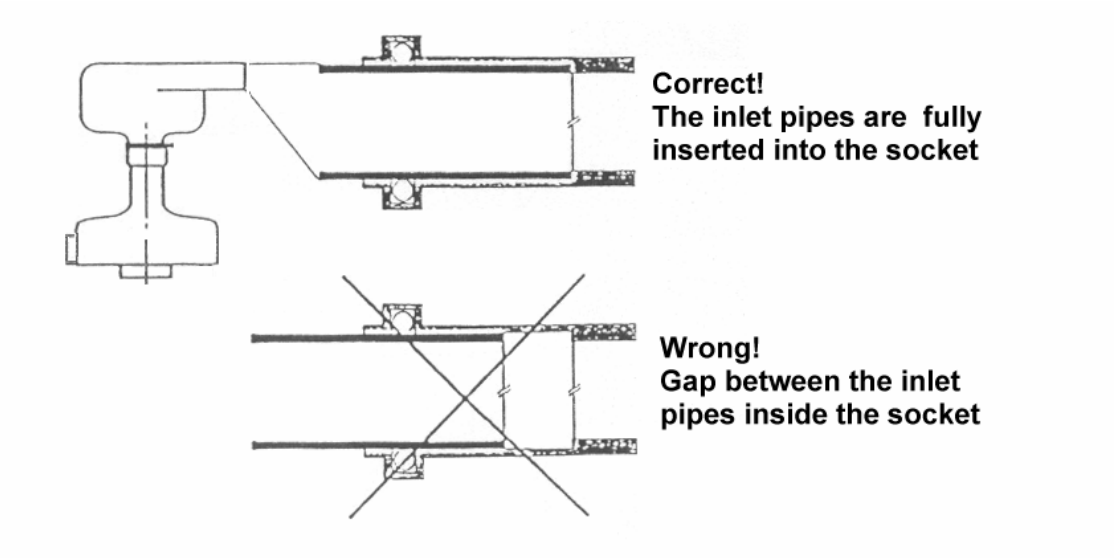
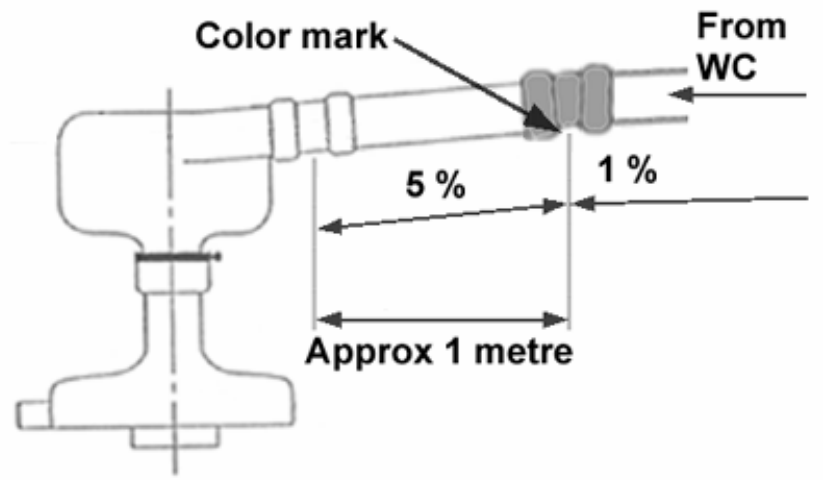


Figure 3: Connecting Separator and inlet pipe in coupler double socket



The horizontal distance between the WC and the Separator must be minimum 1 metre and that last metre (closest to Separator) should be pitched at 5% (5 cm). At further distances the earlier part of the pipe should have a 1% horizontal slope, or as national standards.

Figure 4: Angled double socket for inlet pipes longer than 1 metre

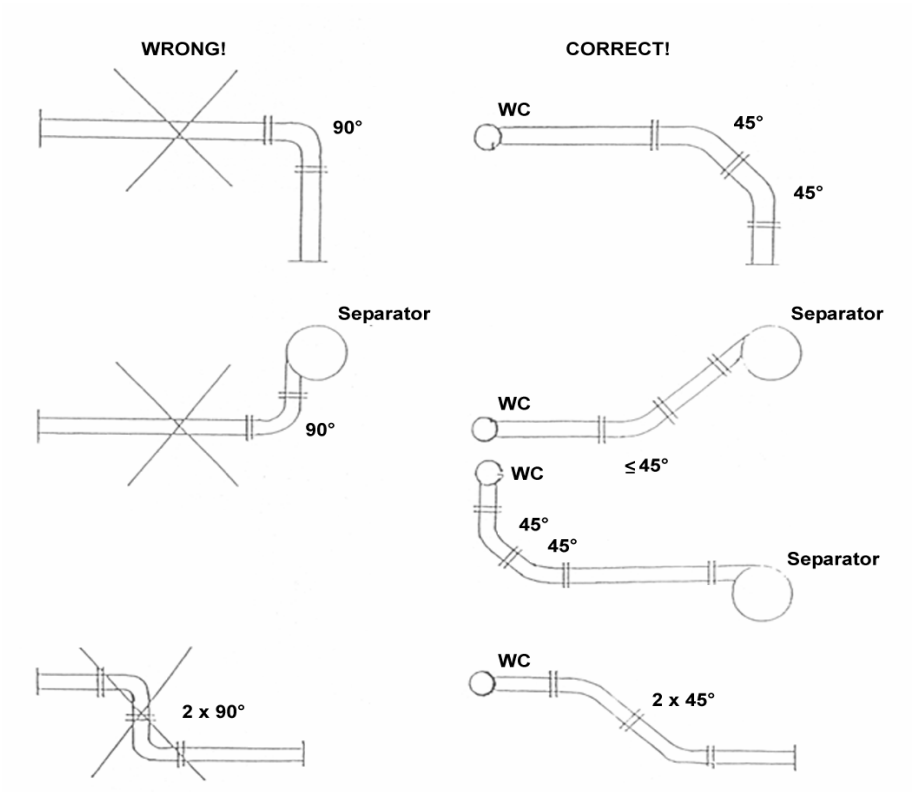
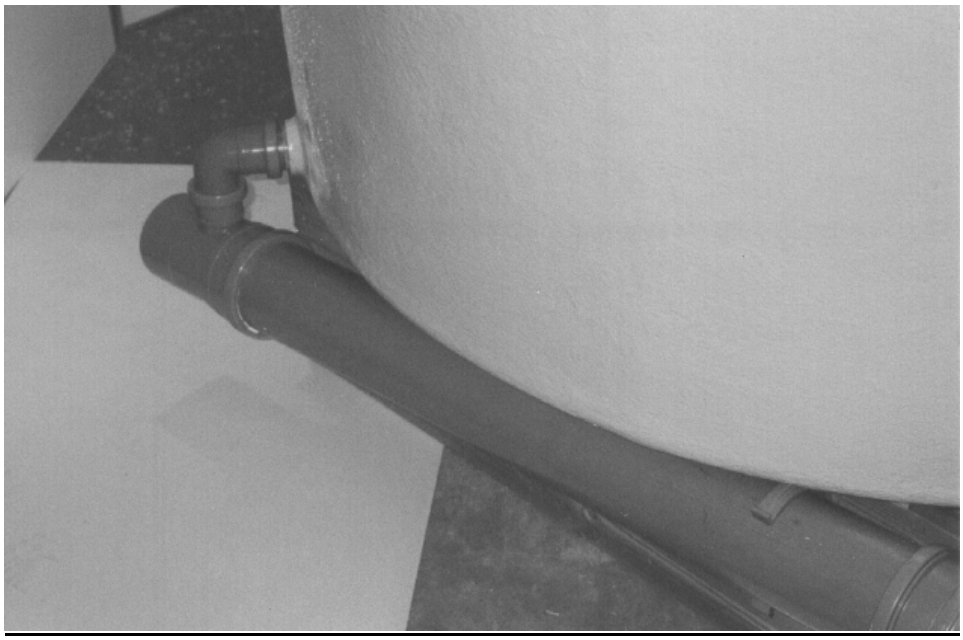


Figure 5: Some examples of horizontal pipe bends

Figure 6: Fluid outlet from Aquatron 4x300 system showing the 4“ vertical connection pipe



Connection of 50 mm drain from the 4x300 Bio Chamber to the horizontal pipe from the Aquatron Separator (coming from right) before the connction to the Water Seal (direction towards left).

Figure 7: Connecting the Bio Chamber drain to the pipe from the fluid outlet of the Aquatron Separator

7. MAINTENANCE INSTRUCTIONS FOR THE AQUATRON 4x300 MODELS

7.1 The monitoring of an Aquatron system in use

It is recommended that an Aquatron system in use should be inspected at two week intervals (approximately). By discovering possible disturbances at an early stage (and to correct them immediately), corrections can be made more easily as compared to cases where a minor disturbance over time have "built" up to a major functional disturbance. The Items 7.2 – 7.7 below give advice about checks and measures for such regular inspections. In Item 8 a special Error Check List is also included.

7.2 Separator

On the top of the Separator is an inspection lid. Occasionally paper may get stuck in the Wire-ring. Open the lid and push the paper down by using a stick or a small pole. Too soft paper may "felt" too soon and there is then a risk that it may stick to the wires which may cause too much water to fall into the Bio Chamber. To avoid this it is recommended that you switch to another type of toilet paper. Depending on water quality (water containing e.g. high contents of Calcium or Iron) a coating may develop on the wires. If heavily coated, remove the parts and clean them with a brush.

7.3 Maintenance and drainage of the Bio Chamber

Check regularly the drainage of the Bio Chamber and the consistency of the compost. Also check that the paper in the Bio Chamber does not build up a pyramid which reaches up to the Separator since that might cause a stoppage in the Separator. If so, tilt the pyramid with a suitable tool, alternatively turn the composting chamber slightly or switch to the next composting compartment. In the Bio Chamber there must be a 4-6 cm layer of bark grinds evenly spread at the bottom. Add some compost from the garden in order to insert micro-organisms. By this the composting process will get a more rapid start. It is important to use coarse bark grinds **NOTE:** Not peat moss. If it is too smooth it may block the drainage grid which will cause a wet compost. Suitable material is bark from pine or similar which may be acquired from garden shops or shops marketing composting products. After using the Aquatron for a couple of years the drainage layer may have to be renewed.

7.4 Composting

A balance between Carbon and Nitrogen is required for an optimal compost. In a latrine compost the Carbon comes mainly from the toilet paper and saw-dust (if inserted as sprinkling powder) while the Nitrogen is in the faeces. In the Aquatron systems a good balance between Carbon/Nitrogen is achieved when using normal amounts of toilet paper. If the compost, having a correctly installed Separator, is still wet; the reason might be too little Carbon. Then sprinkle some saw-dust over the compost.

7.5 Vermi composting

To accelerate the composting process and to effectively reduce the volume (reduction with approx. 90% of the original volume), earthworms may be added (Eisenia Foetida, also called Dung Worm or Red Wiggler; or an equivalent specimen). The worms should be added after a couple of weeks of usage.Compost worms can normally be bought in gardening shops or in stores selling ecological products and equipments. The worms may also be found in garden compost heaps. The vermi composting process works best at temperatures between +12 and 25° C. In year-round living a temperature above +15° C is recommended in the room where the Bio Chamber is installed. At temperatures below +10° C the composting process and the activities of the worms is slowing down and their "food supply" will last longer which may be an advantage in summer houses which are inhabited for a longer period of time.

After having switched to a new composting compartment the worms will remain in the previous filled compartment until it is fully composted. Then the worms will migrate to the active composting compartment in their seeking for "fresh food".

The Bio Chamber must be installed in a frost free area for the survival of the compost worms!

7.6 Emptying a Bio Chamber section

When the first used composting compartment reaches the emptying hole, remove the compost using a small shovel but leave a layer of approx. 5 centimetres thickness. This way you will leave the drainage layer intact (unless the layer has to be renewed). If the refuse has not become fully composted into soil, further composting might be needed.

8. ERROR CHECKLIST

TYPE OF ERROR	CAUSE	MEASURE
8.1 Wet bio-bed	- Bad drainage	Check that the drainage holes are not blocked and that the drainage layer is in accordance with the manual, see Items 5.1 and 7.3.
	- Too much water in the Bio Chamber	**A:** Check that the Separator was installed horizontally and that its vertical line is perpendicular to the Bio Chamber, see Figure 2. **B:** Check that the Wire-ring is positioned correctly and that the wires do not stick to the inside of the the Separator neck. The wires should be slightly bent towards the middle of the Separator neck, see Figure 2. **C:** Check that the cyclone is fully pushed down into the Separator neck and it rests firmly on the Wire-ring. See Item 4.2.1 and Figure 2. **D:** Check pitch of the inlet pipe. At too large pitch, fluid enters the Bio Chamber at beginning of the flushing; at too low pitch, fluid enters the Bio Chamber at the end of the flushing. See Item 4.6.
	- Leaking WC	**E:** Repair the WC.
	- When flushing there is a surge or after flushing there is still a small string of fluid or batches of fluid entering the Separator	Check the pitching of the inlet pipe. It must have a smooth slope and no depressions where fluid waste may gather, see Item 4.3.3.
8.2 Odour in the room	- Wet bio-bed	See above.
	- Wrong ventilation	**A:** The ventilation pipe is too short, it does not extend over the roof. **B:** The ventilation is coupled together with the other sewer ventilation of the house. **C:** Check the waterseal to assure that no odour is coming from the sewer system.
8.3 Odour when windy	- Air is pressed into the ventilation	The ventilation pipe does not extend high enough above roof. It must be lengthened. Mount a vane on the ventilation pipe.
8.4 Stoppage in the Separator	- A too high pyramid of paper has been built up in the Bio Chamber	Tilt the pyramid with a suitable tool, alternatively turn the composting chamber slightly or switch to the next compartment if needed.
	- The wires in the Wire-ring of the Separator are bent or crossed	Straighten the wires.
	- The inlet of the Separator is not fully inserted into the socket	Adjust, see Figure 8.
8.5 Stoppage in the fluid outlet of the Separator	- The flushing water is entering the Separator at too high speed	The pipe between WC and Separator has a too large inclination. See Items 4.3.2, 4.3.3 and 4.6.

8.6	Stoppage in the fluid outlet of the system	- Sediments or foreign objects in the fluid outlet	Check that the fluid is not stopped in the waterseal in the fluid outlet of the system. If necessary clean the waterseal from sediments and foreign objects.
8.7	Flies in the Bio Chamber	- Wet bio-bed	See Item 8.1 and 8.2 above. Spray the inside of the Bio Chamber with an appropriate insecticide.